

COMPLETE LISTING OF CLAIMS
IN ASCENDING ORDER WITH STATUS INDICATOR

Claims 1-17 (cancelled)

18. (currently amended) A memory element structure comprising:

a substrate, and a memory element over the substrate, the memory element including:

a first conductor ~~overlying~~ over a ~~the~~ substrate;

a pinned magnetic structure ~~overlying adjacent~~ over and electrically connected with said first conductor;

a nonmagnetic layer ~~overlying~~ over said pinned magnetic structure;

a sensing magnetic structure ~~overlying~~ over said nonmagnetic layer, said sensing magnetic structure including an antiferromagnetic layer magnetically coupled to at least one ferromagnetic free layer producing a magnetic bias to said at least one free layer; and

a second conductor ~~overlying~~ over and electrically connected with said sensing magnetic structure.

19. (currently amended): The structure of claim 18 wherein said

antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, ~~PtMn~~ PtMn, NiO, and CoNiO.

20. (original): The structure of claim 18 wherein said antiferromagnetic layer includes one or more synthetic layers each comprising two ferromagnetic layers separated by a metal.
21. (original): The structure of claim 18 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.
22. (original): The structure of claim 18 wherein said pinned magnetic structure comprises a plurality of layers including at least one pinned layer.
23. (original): The structure of claim 18 wherein said nonmagnetic layer comprises aluminum oxide.
24. (original): The structure of claim 18 wherein said antiferromagnetic layer provides said bias to said ferromagnetic free layer.
25. (original): The structure of claim 24 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.
26. (currently amended): A memory element structure comprising:
- a first pinned magnetic structure ~~overlying~~ over a conductive layer;
 - a nonmagnetic layer ~~overlying~~ over said first pinned magnetic structure;
 - a second free magnetic structure ~~overlying~~ over said nonmagnetic layer,
- wherein said second free magnetic structure comprises an antiferromagnetic layer ~~overlying adjacent~~ over a ferromagnetic free layer said ferromagnetic free layer having a bias applied thereto; and

said first pinned magnetic structure, nonmagnetic layer and second free magnetic structures patterned to form said memory element.

27. (currently amended): The structure of claim 26 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, ~~PtMn~~PtMn, NiO, and CoNiO.

28. (original): The structure of claim 26 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

29. (original): The structure of claim 26 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

30. (original): The structure of claim 26 wherein said second free magnetic structure includes at least one sense layer.

31. (original): The structure of claim 26 wherein said first pinned magnetic structure includes at least one pinned layer.

32. (original): The structure of claim 26 wherein said nonmagnetic layer comprises aluminum oxide.

33. (original): The structure of claim 26 wherein said bias is provided by said antiferromagnetic layer.

34. (original): The structure of claim 33 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

35. (currently amended): A memory device comprising:

at least one magnetic random access memory element, said magnetic random access memory element comprising:

a first pinned magnetic structure ~~overlying~~ over a conductive layer;

a nonmagnetic layer ~~overlying~~ over said first pinned magnetic structure;

a second free magnetic structure ~~overlying~~ over said nonmagnetic layer,

wherein said second free magnetic structure comprises an antiferromagnetic layer ~~overlying adjacent~~ over a ferromagnetic free layer said ferromagnetic free layer having a bias applied thereto; and

said first pinned magnetic structure, nonmagnetic layer and second free magnetic structures patterned to form said memory element.

36. (currently amended): The device of claim 35 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, ~~PtMn~~ PtMn, NiO, and CoNiO.

37. (original): The device of claim 35 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

38. (original): The device of claim 35 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

39. (original): The device of claim 35 wherein said second free magnetic structure includes at least one sense layer.

40. (original): The device of claim 35 wherein said first pinned magnetic structure includes at least one pinned layer.

41. (original): The device of claim 35 wherein said nonmagnetic layer comprises aluminum oxide.

42. (original): The device of claim 35 wherein said bias is provided by said antiferromagnetic layer.

43. (original): The device of claim 42 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

44. (currently amended): A processor-based system, comprising:

a processor; and

an integrated circuit coupled to said processor, said integrated circuit including a plurality of magnetic random access memory elements, each of said magnetic random access memory elements comprising:

a first pinned magnetic structure ~~overlying~~ over a conductive layer;

a nonmagnetic layer ~~overlying~~ over said first pinned magnetic structure;

a second free magnetic structure ~~overlying~~ over said nonmagnetic layer,

wherein said second free magnetic structure comprises an antiferromagnetic layer ~~overlying~~ over a ferromagnetic free layer said ferromagnetic free layer having a bias applied thereto; and

said first pinned magnetic structure, nonmagnetic layer and second free magnetic structures patterned to form said memory element.

45. (currently amended): The system of claim 44 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, ~~PtMNN~~PtMn, NiO, and CoNiO.

46. (original): The system of claim 44 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

47. (original): The system of claim 44 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

48. (original): The system of claim 44 wherein said second free magnetic structure includes at least one sense layer.

49. (original): The system of claim 44 wherein said first pinned magnetic structure includes at least one pinned layer.

50. (original): The system of claim 44 wherein said nonmagnetic layer comprises aluminum oxide.

51. (original): The system of claim 44 wherein said bias is provided by said antiferromagnetic layer.

52. (currently amended): The system ~~structure~~ of claim 51 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.

53. (new): A magnetic memory element comprising:

a free magnetic layer;

a pinned magnetic layer; and

a non-magnetic layer separating said free magnetic layer and said pinned magnetic layer, said free layer comprising a ferromagnetic layer and an antiferromagnetic layer, the antiferromagnetic layer supplying a magnetic bias to said ferromagnetic layer.

54. (new): The element of claim 53 wherein said antiferromagnetic layer is selected from the group consisting of IrMn, FeMn, NiMn, PtMn, NiO, and CoNiO.

55. (new): The element of claim 53 wherein said antiferromagnetic layer comprises one or more synthetic layers each having two ferromagnetic layers separated by a metal.

56. (new): The element of claim 53 wherein said antiferromagnetic layer is formed to a thickness of less than about 70 Angstroms.

57. (new): The element of claim 53 wherein said pinned magnetic structure includes at least one pinned layer.

59. (new): The element of claim 53 wherein said nonmagnetic layer comprises aluminum oxide.

60. (new): The element of claim 53 wherein said bias is provided by said antiferromagnetic layer.

61. (new): The element of claim 60 having an exchange field between said ferromagnetic free layer and said antiferromagnetic layer that is less than a shape dependent coercivity of said element.